

# Structure, sign and Uexküll's theory of meaning: A philosophical approximation\*

*Estrutura, signo e a teoria do significado de Uexküll: Uma aproximação filosófica*

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**Abstract:** in this paper I seek to develop an approximation between the notions of structure and sign from Uexküll's theory of meaning. As the second part of the theory of self-world, the theory of meaning corresponds to Uexküll's approach to the animal world according to a very particular linguistic and semiotic vocabulary. As consequence of Uexküll's approach, the paper suggests that it can be seen as a conceptual alternative to the reductionisms in contemporary Biology.

**Keywords:** Structure. Sign. Meaning. Uexküll. Biology.

**Resumo:** neste artigo, procuro desenvolver uma aproximação entre as noções de estrutura e signo a partir da teoria de significado de Uexküll. Como a segunda parte da teoria de mundo-próprio, a teoria do significado corresponde à abordagem de Uexküll do mundo animal segundo um vocabulário linguístico e semiótico muito particular. Como consequência da abordagem de Uexküll, o artigo sugere que ela possa ser vista como uma alternativa conceitual aos reducionismos na Biologia contemporânea.

**Palavras-chave:** Estrutura. Signo. Significado. Uexküll. Biologia.

## Introduction

Jakob von Uexküll (1864-1944), an Estonian biologist, has had different interpretations of his work. Quoted and commented by different philosophers and scientists throughout the 20<sup>th</sup> Century, Uexküll developed a theory of the living world based on processes of meaning. In his main work *A foray into the worlds of animals and humans* (UEXKÜLL, [1934] 2010), the text interchanges elements of Linguistics and Semiotics. Although Uexküll was unaware of the works of Saussure and Peirce (SHAROV, 2001, p. 14), he develops his own terminology which is applied to the study of sign systems in the living world.

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\* I am deeply grateful to Professor Albert Ditchfield (Departamento de Ciências Biológicas – Universidade Federal do Espírito Santo/Brasil) for reviewing this paper.

In this paper, I seek to develop an approximation between the notions of structure in Saussure's Linguistic, semiotic processes and Uexküll's theory of meaning. This approximation suggests a conceptual alternative to the reductionism of the functionalist and evolutionary fields in contemporary Biology (GENS, 2014, p. 33).<sup>1</sup> This alternative has been very popular among philosophers and biologists as a program of research that takes the form of a non-reductionist view in contemporary Biology. This view means that although all biological processes can be physically realized, they can also have multiple realizations. Therefore, for Uexküll, beyond the mere physical and evolutionary conditions, it is also fundamental for different organisms that they can be able of perceiving and acting on the environment:

We no longer regard animals are mere machines, but as subjects whose essential activity consists of perceiving and acting [...] all that a subject perceives becomes his perceptual world and all that he does, his effector world. Perceptual and effector worlds form a closed unit, his Umwelt [self-world] (UEXKÜLL, [1934] 1957, p. 6).<sup>2</sup>

In fact, it is noted here that the second part of Uexküll's theory of self-world is the theory of meaning. It is important to understand why a theory of meaning is the second part of a biological theory. Accordingly, as the self-world constitutes the organism's capacity of perceiving and acting on the environment, naturally, our understanding of meaning plays a key place in the research of the living world. Uexküll seeks to make clear that the meaning constitutes the distinctive feature of animate life. For sustaining this view, he develops a strategy of analysis with his own linguistic and semiotic terminology. For Uexküll, the essential activity of animate life is to produce meanings: "how meaning is to be understood, and then to demonstrate [...] that life can only be understood when one has acknowledged the importance of meaning" (UEXKÜLL, [1934] 1982, p. 26).

Thomas Sebeok (2001) who has formulated the term "Biosemiotics" recognizes that Uexküll's theory establishes the biological basis of the study of signs (also see SHAROV, 1998 and 2001; KULL and EMMECHE, 2011). Accordingly, the meaning is a biological property and the living organisms are semiotic agents of translating, communicating, interpreting, etc., their environments (SHAROV, 1998). Thus, the philosophical approximation between the notions of structure, semiotic process and Uexküll's theory of meaning has two starting points:

- 1) *a self-world is a domain of meaning or a structure;*
- 2) *an object is signified from a certain way by different organisms.*

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1 One can see in Ernest Mayr (2005, p. 39-40) the definitions of the functionalist and evolutionary fields in contemporary Biology: whereas functionalist Biology deals with Physiology of all living organisms' activity, cell processes and genome, evolutionary Biology focuses on the temporal dimension of the living world.

2 The notion of self-world [Umwelt] defines the meaning of organism: a being which is constituted by a world of perception and a world of action.

With regard the items 1 and 2, respectively, the notion of self-world aggregates the Saussurean conception of “structure” and the Peircean definition of sign. Organisms refer to objects and act on them through signs. In this sense, it is important to note that, for Uexküll (1926, p. 93), the object is not the thing, rather it is the unity of the thing. It is only within a self-world that something can become a meaningful object.

Following Uexküll's theory of meaning, one can state that the organism's self-world is a monadic process of experiencing the world: each experience has a particular symbolic aspect (CASSIRER [1944] 1994, p. 46).<sup>3</sup> Nevertheless, this symbolic experience cannot be reduced to the physical or historical basis, respectively, the fields of the functional and evolutionary Biology. For Uexküll, the method of studying the animal worlds is not reductionist: “Behaviors are not mere movements or tropisms, but they consist of perception (*Merken*) and operation (*Wirken*), they are not mechanically regulated, but meaningfully organized” (UEXKÜLL, [1934] 1982, p. 26).

As behaviors are supposed to be meaningfully organized, Uexküll's notion of self-world would have anticipated the bases for a conceptual alternative in contemporary Biology (GENS, 2014, p. 35). In addition, as his son Thure von Uexküll points out (2004, p. 20-21), the first premise of Uexküll's theory is what it can be named a “systematic Biology” in which the biological processes are embedded as interrelations between subject and object. This idea anticipates the notion of open systems: because of the constant interrelation between organism and environment, we cannot analyze the meaning of the objects in isolation.

Although an organism is a kind of monadic entity, it is not isolated from the world and organism and world can be seen as parts of the same process in nature. In fact, one can see the meaning as the result of a process of continuity between organism and world and it is what I call the premise of continuity in Uexküll's theory. It must also be understood that the process of meaning has no one single point of view, that is, it is countless and dynamic. This second point is what I call the premise of pluralism in Uexküll's theory of meaning.

From these two premises of continuity and pluralism, it must be noted in Uexküll's theory that “reality” is something that is apprehended by subjects:

No attempt to discover the reality behind the world of appearances [...] has ever come to anything [...] and on the far side of that world there is no world at all [...] When we admit that objects are appearances that owe their construction to a subject, we tread on a firm and ancient ground especially prepared by Kant [whom]

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3 Uexküll ([1934] 2010, p. 43) employs the monadic metaphor of the soap bubble: “We begin such a stroll on sunny day before a flowering meadow in which insects buzz and butterflies flutter, and we make a bubble around each of the animals living in the meadow. The bubble represents each animal's environment and contains all the features accessible to the subject. As soon as we enter into one such bubble, the previous surroundings of the subject are completely reconfigured. Many qualities of the colorful meadow vanish completely, others lose their coherence with one another, and new connections are created. A new world arises in each bubble.” As Gens (2014, p. 37) reminds us, Uexküll embraces a perspectivism which aims to highlight the multiplicity of points of view in comparison to the Leibnizian notion of monad and the image of the soap bubble.

discovered the fundamental principles to which objects are built up by our minds (UEXKÜLL, 1926, p. xv).

In *Theoretical Biology* (1926), particularly, Uexküll undertakes a Kantian reconstruction of Biology according to a non-reductionist view of living organisms. Besides seeking to establish the methodological autonomy of Biology, Uexküll also seeks to define the autonomy of the organism as its capacity of receiving and meaning the stimuli from the outer world. In this sense, the external stimuli are meaningful only if they find an inner disposition for being received and this disposition is inherent in the self-world of the organism. For Uexküll, the relation between the organism and the world is constituted as an inner structure of representing the outer stimuli or what Kant designates “schema” (UEXKÜLL, 1926, p. 94).<sup>4</sup> In Kantian sense, the schema is a formal condition under which a category can be applied to an object of the sensitive experience. According to Uexküll (Idem), comparatively, without the organism’s inner capacity of receiving and meaning the stimuli, nothing can exist in the world. Accordingly, “reality” is what an organism means internally, that is, whether certain stimuli are meaningful to it in its self-world.

From *Theoretical Biology* (1926) to *A foray into the worlds of animals and humans* (1934), one can note the Kantian influence on Uexküll’s intellectual development: the organism’s self-world consists of the inner capacity of meaning and experiencing the world. Even being as a subjective aspect, the self-world is a formal condition of experiencing and apprehending the outer world for different organisms. Therefore, it seems plausible to assert that the Kantian schematism of Uexküll’s theory of self-world is compatible with the so-called structuralist activity. If Structuralism is understood as an activity of apprehending the reality from schemas, like a Kantism without transcendental subject (*pace* Lévi-Strauss), the structure corresponds to the formal conditions of the subject’s activity. It is within a self-world, comparatively, if it is supposed to be the formal condition of an organism’s experience, that a subject can have expression. As Uexküll points out, it is essential for the biologist’s work that he or she can capture the activity of meaning, which is part of the organism’s self-world, as the expression of the subject’s activity.

In short, the aim of this paper is to analyze Uexküll’s theory of meaning and how it can indicate a stimulating program of research. It is a program which takes the form of a non-reductionist view in contemporary Biology from a linguistic and semiotic approach. The question can be put as the following: why do we need a theory of meaning for understanding the living world? Maybe the answer can be that self-worlds are domains of meaning in the living world.

## 1 Structuralism, structure and self-world

In the fifties of the 20th Century, in France, “Structuralism” means a movement of thought in the Humanities in which the reality is apprehended as a formal set of relations. Accordingly, the meaning of an object is defined within a system of

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4 “Following Plato here, Kant compares the schema of empirical things with a kind of monogram, which has stamped itself on our mind, and forms the starting-point both for shaping things and for drawing images in the imagination” (UEXKÜLL, 1926, p. 94).

relations or what can be designated the structural object. Thus, “structure” means a domain of signification of different kinds of linguistic, anthropological, social, economic, political, etc., relations. The structuralist activity (BARTHES, 1967, p. 19) consists of establishing the relationships of signification in the different fields of the Humanities (Linguistic, Anthropology, Sociology, Economy, Politics, etc.).

Many authors understand that Structuralism is an epistemological point of view on the relation between knowledge and reality. From this view, the observed reality is sustained by an underlying formal organization to it or a structure: “[...] the structure is at the same time reality – the organization which is found by the analysis – and intellectual tool – or law of variability” (POUILLON, 1967, p. 13). Structure is an abstract group from which it is gotten concrete realizations, representations or particular meanings that can be given to its elements. Structure is a “language” which has no semantics and at the same time it is the formal condition for the constitution of semantic contents (POUILLON, 1967, p. 14). The term “structuralism” was coined by Roman Jakobson in 1929 and it indicates an alternative way for science:

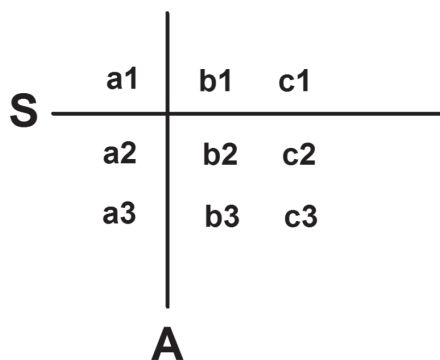
Were we to comprise the leading idea of present-day science in its most various manifestations, we could hardly find a more appropriate designation than structuralism. Any set of phenomena examined by contemporary science is treated not as a mechanical agglomeration but as a structural whole, and the basic task is to reveal the inner, whether static or developmental, laws of this system. What appears to be the focus of scientific preoccupations is no longer the outer stimulus, but the internal premises of the development; now the mechanical conception of processes yields to the question of their functions’ (JAKOBSON *apud* KULL and EMMECHE, 2011, p. 5).

From a biological point of view, comparatively, Structuralism means:

The history of semiotics in the 20th century has been influenced deeply by structuralism in linguistics, and this “semiology” is related to a similar structuralist movement in theoretical biology. This, together with a variety of approaches that emphasize the properties of relation, signification, wholeness and contextuality, can be seen as forerunners to a more fully developed semiotic biology, that sees living creatures not just as passively subjected to universal laws of nature, but also as active systems of sign production, sign mediation and sign interpretation [...] Such a biology is not in conflict with present-day biological research, but it promises to be a good guide towards a theoretical biology that does not turn the emergence of life—and with it, meaning and intentionality—into an incomprehensible mystery. Thus, biosemiotics would provide the basis for linking general biology with general linguistics (KULL and EMMECHE, 2011, p. 1).

However, the term “structure” has its epistemological root from Ferdinand de Saussure’s *Cour de Linguistique Générale* – the “Cour” was posthumously published

in 1916. In accordance with the Saussurean Linguistics, the meaning of a sign depends on its relationships within the system (or the “langue”). Saussure intends to study the “langue”<sup>5</sup> as a formal system of relations that is defined by opposition and equivalence between its elements (signs). Concerning to the method of analysis (SAUSSURE, 2002, p, 95; 143-4), it is important to be remarked a distinction between the associative axis and the syntagmatic axis (see Illustration 1). On the first axis (A), it is performed the choice between co-existing elements and their relationships are outside of temporal dynamics. On the second axis (S), alternatively, the elements are combined and they undergo transformations—this second axis encloses the first one:



**Illustration 1:** the set of relationships forms a “structure” and the meaning of an element depends on its relation within the system—an element means nothing by itself.

According to Saussure, the distinction between the two axes defines respectively the fields of the “static [or structural] Linguistic” and the “evolutionary [or historical] Linguistics.” In addition, this distinction defines two orders of “synchronic” and “diachronic” phenomena (SAUSSURE, 2002, p. 96). For him, in fact, the object of Linguistics is the study of the synchronic phenomena of the “langue,” that is, the phenomena that are produced in the “langue,” whose background is constituted by the associative and syntagmatic axes:

Structuralism puts a strong emphasis upon the importance of synchronic rather than diachronic factors that make structures. It is also based on binary oppositions, and emphasizes the importance of codes and meaning [...] Structuralism in linguistics, seeing everyday use of language as guided by some deeper principles of a relational system and envisioning the possibility of extending the notion of structures of significance beyond

5 “[...] the potential linguistic system which resides in the mind of all members of a speech community, and waits to be activated in ‘parole’, in individual utterances, or acts of speech” (SANDERS, 2006, p. 5).

language to other cultural phenomena (KULL and EMMECHE, 2010, p. 5).

In comparison to Saussure's structural method, it can also be sustained that Uexküll would have anticipated the outlines of a synchronic study of the organisms from the notion of self-world. Whereas Saussure refuses the reduction of the "langue" to the physiology of the nervous system or to the historical philology, Uexküll would have refused a reductionist approach in Biology. In Philosophy of Biology, reductionism means:

[...] a metaphysical thesis, a claim about explanations, and a research program. The metaphysical thesis that reductionists advance (and antireductionists accept) is physicalism, the thesis that all facts, including the biological facts, are fixed by the physical and chemical facts; there are no nonphysical events, states, or processes, and so biological events, states, and processes are 'nothing but' physical ones (ROSEMBERG, 2008, p. 120).

In addition to the ontological reductionism, it can also be noted a methodological reductionism in two senses:

- 1) Reductionism in physicalist sense: the explanatory core is what happens inside the organism;
- 2) Reductionism in evolutionary sense: the explanatory core is what happens on the organism from the outside.

Although this characterization is not precise, one can say that whereas in the functionalist sense, the explanation aims to the internal causes and *how* the biological processes take place, in the evolutionary sense, the aim is to explain the external causes and *why* biological phenomena occur (MAYR, 2005, p. 40).

For Uexküll, however, the study of the living organisms has nothing to do with both ontological and methodological reductionisms. Again, in comparison to the Saussurean method, Uexküll advances a synchronic and structural study of living organisms in that each self-world is a particular symbolic domain or a structure: beyond the internal and external efficient processes that operate *inside* and *on* the organisms, each one has a particular way of perceiving and acting on the world. The ways of perceiving and acting are countless and they cannot be simply reduced to the physical processes inside and outside the organisms. Just as for Jakobson's methodological view of the structuralist task, for Uexküll, the task of the biologist is to understand the inner and immaterial traits of the organisms' self-world: "From [one] example [...] we can deduce the basic structural traits of the Umwelt, which is valid for all animals" (UEXKÜLL, [1934] 1957, p. 12).

Structure is not a material thing: it is the unity of immaterial relationships among the parts of an animal body. Just as

plane geometry is the science not of the material triangles drawn on a black board with chalk but of the immaterial relationships between the three angles and three sides of the closed figure [...] so biology treats of the immaterial relationships of material parts united in a body so as to reconstitute the structure in imagination (UEXKÜLL *apud* KULL and EMMECHE, 2010, p. 9).

Just as for Saussure, the “langue” is a formal system of relations and not a substance, for Uexküll, the self-world is a structure which is not physically determined. Because of this structuralist or immaterialist view, it is established an epistemological tension between Uexküll’s theory and the Darwinism.<sup>6</sup> For Uexküll, the Darwinist explanations in terms of material and efficient processes are insufficient because they cannot apprehend the diversity of the meaningful processes between the different organisms and the environment:

In this respect, there is no such thing as evolution; the lowest, just like the highest of living creatures are, as regards their micromechanics and microchemistry, equally perfect. In face of this fact, all attempt to explain living things as chance agglomerations of substances collapses utterly (UEXKÜLL, 1926, p. 114).<sup>7</sup>

Again, comparatively to Saussure for whom the object of Linguistics is the synchronic phenomena of the “langue,” insofar Uexküll claims that there is no evolution, he seems to sustain a synchronic understanding of the living organisms. In fact, Uexküll’s understanding of the biological processes minimizes the epistemological significance of the diachronic phenomena of the biological evolution. Whereas the Darwinian strategies of explanation of the biological processes emphasize the priority of material and efficient causes, respectively, individual variation and natural selection, in Uexküll’s theory, the explanations aim at highlighting the meaning of those processes in nature. For Uexküll, when nature is at work we can see that the meaning is the product of dynamic, active and countless processes in the living world from the lowest living creatures to the highest ones.

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6 It is hard to get a precise conception of Darwinism. However, historically and philosophically, one can state that Darwinism represents a form of evolutionary explanation by assuming that the individuals are subject to actions of internal and external forces whose result is the biological evolution. In this sense, while the individual variation consists in the material cause, the action of the natural selection consists in the efficient cause. I think this conception can be ascribed to both Darwinism and neo-Darwinism views of the biological evolution.

7 [...] structuralism supports a non-Darwinian evolutionism [...] This opposition of structuralism and Darwinism is not simply a debating device. In the first place, it is of historical significance for a number of earlier writers ([William] Bateson, Driesch, D’Arcy Thompson) who employed structuralist concepts did so in the course of formulating critical evaluations of Darwinism (KULL and EMMECHE, 2011, p. 7-8).



For Uexküll, the Darwinist principle of material and efficient causality cannot explain the phenomenon of meaning.<sup>8</sup> If the organism's behavior is to be understood as meaningfully organized, only the process of variation and selection of stimuli, which produces the organism's adaptation to the environment, cannot indicate why the stimuli are meaningful. Instead, the meaning of the relation with the environment can only belong to the organism's self-worlds and its capacity of receiving the stimuli. It is not the adaptation to the external stimuli through variation and selection that gives them meaning, rather whether they can be object of the meaningful reception of an organism. If there is a stimulus and it does not find the capacity for its reception, one cannot assume that it is meaningful with regard the relation between organism's behavior and environment.

As a premise of Uexküll's theory, accordingly, the meaning is the result of a process of continuity between organism and world. As an alternative approach to Darwinism, it is not the case of material and efficient continuity, rather it is a "living continuity" (UEXKÜLL, 1926, p. 238). The stimulus must be noted as a sign by an organism. If the stimulus is not noted, it is not selected and it cannot be meaningful. Consequently, the selection of the stimulus is not achieved as a mechanical response to the organism's environment like a causal process of antecedents and consequences: if stimulus, then response. In Uexküll's theory, behavior does not mean simply movements or tropisms, rather it is meaningfully organized in the organism's self-world. So the organisms select among different stimuli from the outer world only those ones that can be meaningful for them. And it is only inside an organism's self-world that a stimulus can be meaningful or means something. As we will see, this is a principle of meaning in accordance with Saussure's Linguistics in that an element is meaningful within a system of internal relations. Equally, this principle of meaning is also in accordance with the Peircean triad Sign-Object-Interpretant: a sign only means an object according to an interpretant action.

According to Uexküll's theory, the internal capacity of an organism reception is determined by its self-world. The simple adaptation to external stimuli cannot give them meaning in that the meaning depends on the internal capacity of the organism reception. So one cannot state that the meaning is a property of the external stimuli which is mechanically driven to organism's inside.<sup>9</sup> The meaning of the stimulus depends on the capacity of the organism's reception and integration to its self-

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8 See KOUTROUFINIS, 2014, p. 10: [...] physicalistic metaphysics and Neo-Darwinism cannot explain the growth of interiority and the progressive complexification of experience in evolution. Animal experiences are usually teleologically organized since they are directed to a certain end-state. For example the olfactory experience of an animal which finds its nourishment by following a gradient of odor intensity to its source is not an end in itself but serves for the sustainment of the living self. In other words, organismic teleology is not only a purposeful end-directedness but also an intentional one.

9 We find a similar criticism of a reductionist view in James's analysis on Spencer's definition of mind (JAMES, 1878): "Mr. Spencer [...] finds that the formula "adjustment of inner to outer relations", which was the definition of life, comprehends also "the entire process of mental evolution" (p. 2) [...] The mind, according to his philosophy [Spencer's philosophy], should be pure product, absolute derivative from the non-mental (p. 6) [...] Mental interests, hypotheses, postulates, so far as they are bases for human action – action which to a great extent transforms the world (p. 17)."

world. In the relation between the organism and the environment, the self-world represents the internal capacity of receiving and meaning the external stimuli and it cannot be confused with the processes of material and efficient causality:

Meaning is the guiding star that biology must follow. The rule of causality is a poor guide: causal relationships deal only with antecedents and consequences, thereby completely concealing from us broad biological interrelationships and interactions (UEXKÜLL, [1934] 2001, p. 43).

It is also because of the epistemological tension with the Darwinism that Uexküll was frequently labeled as vitalist, anti-evolutionary and mystic (GOLDSCHMIDT, 1956).<sup>10</sup> But if Uexküll's theory indicates an epistemological tension with the Darwinism, it does not mean a radical opposition to it. For me, actually, it is the epistemological tension with the Darwinism what makes Uexküll's theory potentially fruitful: it can be seen as stroll through the different and countless living worlds from which we can state a pluralistic and non-reductionist view in contemporary Biology whose explanatory core is the investigation of meaning.<sup>11</sup>

Thereby, in comparison with the Saussurean Linguistics, one can note that a self-world is a formal domain of meaning or a structure. That is, it is within a self-world that something becomes a carrier of meaning (or a sign): "[...] a sign 'is a unit with several elements that are functionally related to each other and to the whole', similar in this respect to cause and effect" (UEXKÜLL *apud* DEELY, 2004, p. 27). According to Uexküll's theory of meaning, one same thing can become a sign with different meanings inside the different self-worlds:

Let us examine, for instance, the stem of a blooming meadow flower and ask ourselves which roles are assigned to it in the four environments [self-worlds]: (1) in the environment of a flower picking girl who is making a bouquet of colorful flowers and sticking it as a decoration on her bodice; (2) in the environment of an ant, which uses the regular pattern of the surface of the stem as an ideal paving to get to its feeding area in the flowers's leaves; (3) in the environment of a spittle-bug larva, which bores into the vascular system and uses it as a tap in order to build the liquid walls of its airy house; (4) in the environment of a cow, which grabs both stem and flower in order to shove them into her mouth and consume them as food. The same flower stem plays the role of an ornament, a path, a spigot, and a clump of food (UEXKÜLL, [1934] 2010, p.143).

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10 "Take, for instance, the last text Uexküll published during his lifetime, an essay entitled 'Darwin's Guilty' that appeared on January 14, 1943, on the front page of the *Deutsche Allgemeine Zeitung*" (WINTHROP-YOUNG, 2010, p. 209).

11 Meaning is part of the dynamic processes between different organisms and environment. So Uexküll's theory of meaning is really a philosophy of organism (and *pace* Whitehead). On the meaning of organism and a 'theory of organism', see LONGO and MONTÉVIL, 2013.

From this quotation, it can be illustrated as a very good example of the premises of continuity and pluralism in Uexküll's theory of meaning. All situations that are described by Uexküll show that the same object can have different meanings and the meaning emerges from the structural and semiotic relationships between organisms, objects and environment. The notion of emergence displaces the meaning from a correspondence with the physical and efficient processes to the field of the structural relationships between organisms, objects and environment:

The structural composition of the flower stem and its chemistry play no part on the life stages of the gill and the ant. On the other hand, the digestion of the stalks is essential for the cow [...] Anything and everything that comes under the spell of an environment [self-world] is either redirected and re-formed until it becomes a useful carrier of meaning or it is completely neglected (UEXKÜLL, [1934] 2010, p. 144).

A structuralist view, importantly, assumes a certain independent existence of structural laws from the material sphere of phenomena or objects. This also has several manifestations within semiotic approaches to biology (KULL and EMMECHE, 2010, p. 10).

For Uexküll, as the example of the stem of a blooming meadow flower illustrates, the same object can have different meanings according to its structural and semiotic function within a self-world. Again, this is a principle of meaning in accordance with Saussure's Linguistics in that an element is meaningful within a system of internal relations. Equally, it is also in accordance with the Peircean Semiotics in that a sign only means an object according to an interpretant action. In short, one can state that a self-world is a system of signs interpreted by an organism (SHAROV, 2001, p. 211).

The comparisons between Saussure's Linguistics and Peirce's Semiotics are significantly substantial (ECO, 2005).<sup>12</sup> Saussure ([1916] 2000, p. 24) understands that Semiology or "Science that studies the life of signs in the heart of social life" is a part of Social Psychology and it includes Linguistics. However, Saussure's notion of sign can be a particular case of Peirce's Semiotics. In the Saussurean Linguistics, the sign has a dichotomous character of a unity which is constituted by the "signifier" and the "signified" whose combination determines the meaning. In Peirce's Semiotics (PEIRCE, 1977, p. 45-46), alternatively, the meaning is the result of the process of "semiosis" and it involves the triadic relation between sign, its object and its interpretant.<sup>13</sup> And whereas the Saussurean notion of sign is directed to the symbolic level of language, in Peirce's Semiotics, the notion of sign is extended to non-symbolic or natural fields of signification.

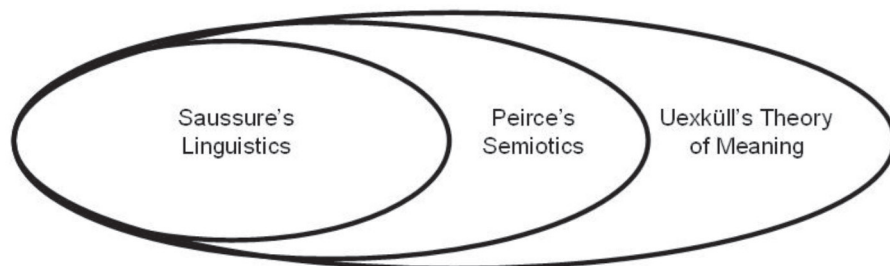
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12 [...] the ideas of the Swiss linguist Ferdinand de Saussure (1857-1913) and the American philosopher Charles S. Peirce (1839-1914) became the basis for circumscribing an autonomous field of inquiry which sought to understand the structures that undergird both the production and interpretation of signs (SEBEOK, 2001, p. 5).

13 [what] "is wrong is that people think of 'a meaning' as a kind of entity which can be described wholly without reference to the total activity of 'semiosis'" (AUSTIN, 1961, p. 29).

About the approximation between Peirce and Uexküll, it is plausible to suppose, both of them seem to agree that signs are used by some individual for meaning an object. However, as Sharov (2001, p. 213) points out, it is to be noted some important differences between Peirce and Uexküll. Whereas Peirce seems to be mostly interested in the human language, as a biologist, Uexküll employs semiotic notions on the different types organisms of the living world. In this sense, I understand that Peirce's Semiotics is a particular case of Uexküll's theory of meaning (see Illustration 2):

From a semiotic point of view, semiology is based on linguistic, dyadic and quite static models of sign relation, whereas semiotics stands on more general triadic and dynamic models. Therefore, identification of semiology with semiotic would be wrong. Semiological models represent the restricted special cases of semiotic models (KULL and EMMECHE, 2010, p. 12).



**Illustration 2:** Saussure's Linguistics is a particular case of Peirce's Semiotics which is a particular case of Uexküll's Theory of Meaning.

This diagram will not have possibly the acceptance of a Peircean standard view. According to such a view, the inorganic world is also constituted by processes of semiosis and consequently Peirce's Semiotics cannot be a particular case of Uexküll's theory of meaning. Following Uexküll's theory, however, I argue that the diagram is sustainable: the processes of semiosis are essentially phenomena of the organic world and from which the inorganic world lacks. Then Peirce's Semiotics can be a particular case of Uexküll's Theory of Meaning. I will argue for this view from two points.

Firstly, the notion of self-world defines "organism" as a being with the capacity of perceiving and acting on the world. That is, the relation between organism and world can only be the meaning of an active process. Self-world is indeed an active property of the organic world and from which the inorganic world lacks. The notion of an active property means here what Aristotle (DA 412a 11-13) designates "soul" as the principle of the animate beings—for example, crystals, atomic behavior, electric current, and so on, would lack of soul.<sup>14</sup> For Aristotle, soul is an active property of

<sup>14</sup> See KOUTROUFINIS, 2014, p. 10: "[...] since non-living physical systems have neither Umwelt (they have only externally set surroundings) nor self."

an organic body. If a body lacks soul, it is not alive. Soul is thus an active form by which a body accomplishes its vital functions. From the Aristotelian conception of soul, one can claim that self-world is an active property of the animate world in contrast to the inanimate world. In *Theoretical Biology*, actually, Uexküll underlines the contrast between the world of the physicist and the world of the biologist:

According to the physicist, there is only one world; and this is not a world of appearance, but a world having its own absolute laws, which are independent of all subjective influence [...]. All other properties of things are referable to changes of place by atoms [...]. The biologist, on the other hand, maintains that there are as many worlds as there are subjects, and that all these worlds are worlds of appearance, which are intelligible only in connection with the subjects (UEXKÜLL, 1926, p. 70).

Secondly, as Uexküll points out, we can observe that the utilization of meaning is an activity of the self-worlds of animals and plants. Both animals and plants have characteristic self-worlds that make possible meaningful relations with the environment—in the Aristotelian sense, animals and plants have “soul.”<sup>15</sup> In the case of plants, for example, the tropism consists of the development of a meaningful relation with the environment under the influence of an external stimulation (heat, light, etc.). In this case, the plant uses the external stimulation as factor of meaning. It is a factor and not a carrier of meaning because the plant does not act on the environment as the animal does:

The habitat of an animal, which spreads out around it, transforms itself before its eyes into its Umwelt (subjective universe), where the most varied meaning-carriers scurry about. The habitat of the plant, which is limited to the area around its location, transforms itself, from the plant's point of view, into a dwelling-integument consisting of various meaning factors that are subject to regular change. The life-task of the animal and the plant consists of utilizing the meaning-carriers and the meaning-factors, respectively, according to their particular building-plan (UEXKÜLL, [1934] 1982, p. 36).

Although plants have what one can call degenerate self-worlds in as much that they lack the capacity of acting on the environment, they do not lack the capacity of using the factor of meaning. As animals and plants are users of meaning, it can be asserted that the processes of meaning are phenomena of organic life and from which the inorganic world lacks. Indeed, in the inanimate world, the modifications of the objects can be ascribed to the external causes to them. Contrarily, in the animate world, the cause of modification must be inside the organism itself. In the first case, the heteronomy denotes the behavior of the object. In the second case, alternatively, it is essentially a process of autonomy which determines the meaning of the organism behavior (UEXKÜLL, 2004, p. 12). For me, it seems clear that the

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15 Sensitive soul for animals; and vegetative soul for plants.

production of meaning is a distinctive feature of animate world and consequently Peirce's Semiotics can be seen as a particular case of Uexküll's theory of meaning.

## 2 Sign, semiosis and self-world

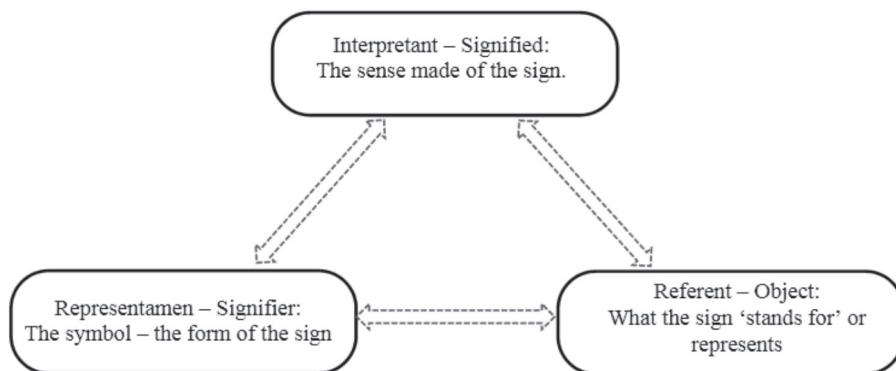
Sebeok (2001, p. 27) recognizes that Uexküll's theory is in conformity with and it establishes the biological foundations of the contemporary study of signs. Following the same way of reasoning, Sharov (2001) identifies the roots of Biosemiotics from the notion of self-world and he defines it as "the science of signs in living systems." Living systems and organisms carry out meaningful interactions with the environment and consequently they are "messages" and not only objective things. Accordingly, as Sharov (2001) points out, the linguistic and semiotic notions can be translated into the activities of the organisms and then the relations between organisms and environment are processes of translation, communication, signification, interpretation, etc., (also see GENS, 2014, p. 41).

In the biosemiotic context, the main idea is the process of semiosis. However, and according to Peirce, semiosis consists basically of a relationship between three terms that are interconnected:

[...] by "semiosis" I mean [...] an action, or influence, which is, or involves, a coöperation of *three* subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs. {Sémeiōsis} in Greek of the Roman period, as early as Cicero's time, if I remember rightly, meant the action of almost any kind of sign; and my definition confers on anything that so acts the title of a "sign" (CP 5.484).

The triadic relationship Sign (S) – Object (O) – Interpretant (I) or semiosis describes a process in which signs refer to objects. Besides of being triadic, semiosis is also cyclic:

### The Semiotics of Charles Sanders Peirce



**Illustration 3:** the Peircean triadic relation 'S-O-I'.

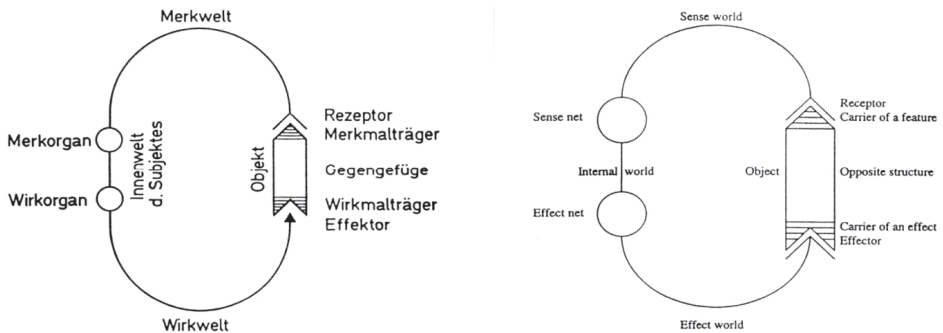
It is interesting here to remark the notion of semiosis in Biosemiotics from Peirce's conception:

Semiosis is the biological capacity itself that underlies the production and comprehension of signs, from physiological signs to those that reveal a highly complex symbolism (SEBEOK, 2001, p. 8).

Semiosis is what distinguishes all that is animate from lifeless (SEBEOK *apud* KULL and EMMECHE, 2010, p. 2).

Semiosis is the sign process—the fundamental process that carries meaning and in which meaning is created. It is the process—not at all simple—that mediates purpose and causality, living and dead aspects of nature, and makes it possible to see how to overcome a crude dualism of mind and matter, as well as how the dynamics of the actions of signs provides a better approach to living systems than our dichotomies of mental versus physical properties. In semiotic investigations of this process, a series of models to describe its peculiarities has been worked out' (KULL and EMMECHE, 2010, p. 2).

In Uexküll's theory, the functional cycle is a very good illustration of semiosis (see Illustration 4). In the description of the functional cycle as meaning cycle, Uexküll's theory of meaning represents a semiotic model and implicitly it supposes the Peircean triadic relation 'S-O-I'.



**Illustration 4:** *Funktionskreis* or *functional cycle* in German and English versions (UEXKÜLL, [1920] 1957, p. 10; KULL, 2001; UEXKÜLL, [1934] 1982, p. 36; [1934] 2010, p. 32). The functional cycle describes the self-world as an unity which is constituted by “sense world” and “effect world.” The functional cycle represents the organism as a subject that integrates objects into its Umwelt (RÜTING, 2004, p. 53).

The functional cycle describes the form or structure of different and countless self-worlds. However, as form or structure, the functional cycle is not identified to the



physical basis of its realization. For us, observers, the functional cycle is abstract and at the same time it has a double functional form as a type of epistemological reversibility between two perspectives:

- 1) Subjective form of the self-worlds: perspective of first person—the cycle of functions describes how the organism perceives and acts on the world.
- 2) Objective form of the observation: perspective of third person—the cycle of functions describes how the observers perceive the relation between organism and world.

For the organism itself, there is no functional cycle at all. However, the functional cycle describes the organism's self-world as an unity which is constituted by "sense world" and "effect world" (see Illustration 4): the organism's action consists of perception and operation on an object. However, before the organism's acting, the object is meaningless. In this sense, following the functional cycle, firstly, some sensitive impression must be noted by the organism as carrier of a feature in the organism's sense world (see the upper part of the Illustration 4). Secondly, the carrier of feature is driven to the organism's effect world and then it becomes carrier of an effect for the organism's action on the object (see the lower part of the Illustration 4):

The object only takes part in this action to the extend that it must possess the necessary properties, which can serve on the one hand as feature carries and, on the other, as effect sign carriers, and which must be in contact with each other through a reciprocal structure [...] The schema of functional cycle shows how subject and object are interconnected with each other and form an orderly whole (UEXKÜLL, [1934] 2010, p. 49).

Since no animal ever appears as an observer, one may assert that no animal ever enters into a relationship with an "object". Only through the relationship is the object transformed into the carrier of a meaning that is impressed upon it by a subject (UEXKÜLL, [1934] 2010, p. 140).

Accordingly, it is only in the relation with an organism that an object can be meaningful. It must be also noted that the functional cycle represents a structure in that the relation of its elements is triadic and cyclic just like in the Peircean triad. This process can be "depicted as a closed loop of interactions" (RÜTING, 2004, p. 53):

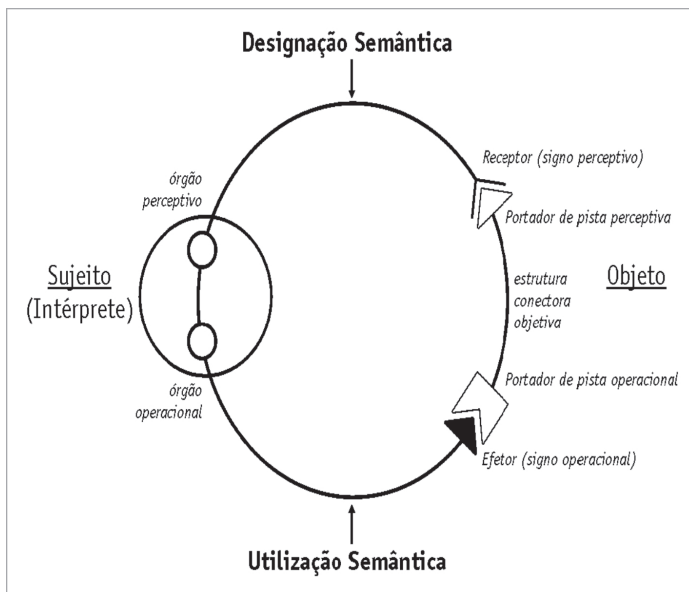
[S) – (O) – (I)] = [carrier of meaning – object – organism]

Uexküll argues that the organism's activities of meaning cannot be simply reduced to physicalist or evolutionary explanations. Actually, the activities reveal a "subject" (or interpretant) who maintains a meaningful relation with the environment and then things can become "carriers of meaning" (or signs). As we will see, it is particularly the case of "index" in the Peircean categories of signs. From the functional cycle, comparatively, a sign is anything which stands for anything else for an organism in a certain way. The functional cycle describes the structural correlation between the



organism and certain characteristics of the environment. That is, those characteristics that can be meaningfully assimilated by the organism and translated into carriers of meaning (or signs).

At the Illustration 5, comparatively, it can be seen the relation between the Peircean triad (S-O-I), the Saussurean conception of structure as a system of internal relations and the schema of the functional cycle.



**Glossary:**

Objeto: object

Estrutura conectora objetiva: objective connecting structure

Portador de pista perceptiva: carrier of perceptual cue

Receptor (signo perceptivo): receiver (perceptual sign)

Designação semântica: semantic designation

Órgão perceptivo: perceptive organ

Sujeito (intérprete): subject (interpretant)

Órgão operacional: effective organ

Utilização semântica: semantic utilization

Efetor (signo operacional): effector (effective sign)

Portador de pista operacional: carrier of effective cue

**Illustration 5:** Thure von Uexküll (2004, p. 9—this is the Portuguese translation) describes the functional cycle of his father as a semiotic activity in which the process of semiosis is manifest. In the words of Uexküll, the father: “Indeed, one can speak of functional cycles as meaning cycles, whose task is determined to be the utilization of carriers of meaning” (UEXKÜLL, [1934] 2010, p. 150).

As one can see at the Illustration 5, the functional cycle describes the organism's activity as the interpreter of signs inside a system of relations. In this sense, we are confronted with a surprising result in trying to identify the object: it does not exist! It only exists inside the system of relations as structural object or semiotic object and consequently it has nothing to do with real objects that we, as observers, can perceive in the world.<sup>16</sup> The object only exists or it is meaningful whether a sign is simultaneously taken to be carrier of perceptual cue and carrier of effective cue by an organism. That occurs only at the end of the functional cycle (see the right side of the Illustration 5).

As a structural or semiotic model, the functional cycle is a tool for the observer of animal worlds (UEXKÜLL, 2004, p. 25-26). But, no observer can exhaust all processes of meaning insofar as they are multiple and countless as well as the forms of life are. As noted by Kull and Emmeche (2010), actually, life is to be understood as the action of signs. Accordingly, it is a conception of life which indicates a non-reductionist view different from the functionalist and evolutionary fields in contemporary Biology. And it is also a conception of life which was latent in Uexküll's theory of meaning. Indeed, for Uexküll, one can assume that life is an activity of meaning production.

### 3 Structure, sign and self-world: an exemplary case of Uexküll's theory of meaning

We will see an exemplary case of Uexküll's theory of meaning on "the interpretation of the spider's web" (UEXKÜLL, [1934] 2010, p. 157). The term "interpretation" is not accidentally used here—interpretation means "semiosis." The web is a "carrier of meaning" because it means something. For Uexküll, anything can be a carrier of meaning. On its work of constructing a web, the spider assigns to it the function of meaning the characteristics of the real object (or the fly) as an archetype: the size, weight, shape, bulk, etc., of the fly's body. But, the archetype does not mean a fly's portrait because the fly does not exist yet: the spider weaves its web before meeting a real fly:

The spider does not do that at all. It weaves its web before it has ever met a physical fly. The web can therefore not be a representation of a physical fly, but rather, it represents the primal image [Urbild] of the fly, which is not physically not at all present (UEXKÜLL, [1934] 2010, p. 158-9).

From the spider's point of view, the web plays the role of meaning the fly. So the web cannot be the copy of the fly, but, it means the fly's archetype (or *primal image*) which is not physically given. The idea is to mean an object without its representing (ARAÚJO, 2012).

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16 Both pragmatism and structuralism have proposed their own conceptions, the former in terms of the "interpretant" of a sign (according to Peirce, the reaction of the interpreter to the sign), including complex dispositions to act, the latter in terms of the (arbitrarily set) role of the sign in the system of langue. The structuralist conception, that has some aspects in common with the later Wittgenstein's idea of meaning as role in a language game (SBISÄ, 2011, p. 3-4).

In Peirce's Second Trichotomy (PEIRCE, [1897] 1977, p. 52), we can find the following categories of relation between the sign and the object:

- 1) Icon: "the sign which refers to its object by similarity" (CP 2.247);
- 2) Index: "the sign which refers to its object by causal relation with it" (CP 2.248);
- 3) Symbol: "the sign which refers to its object by a conventional action" (CP 2.249).

In the example of spider's web, as it is described by Uexküll, it seems clear that it is the case of index: the web means the fly because of the reference to its eventual existence.<sup>17</sup> There is no similarity between the web and the fly. From the spider's point of view, the web is an index in that it refers to the fly by a causal relation with it. In this sense, it can be noted there is a meaningful relation between the spider and the fly and not simply a process of causality:

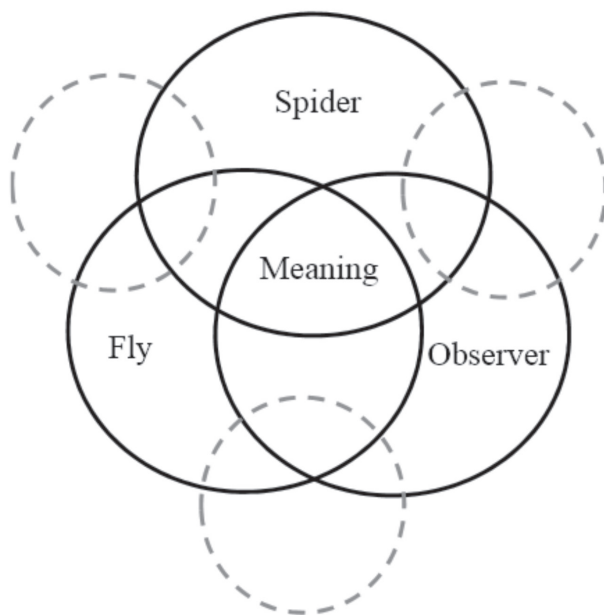
And I now assert that the primal score of the fly (which one can also designate its primal image) affects the primal score of the spider in such a way that the web spun by the latter can be called 'fly-like' [...] Meaning is the pole star by which biology must orient itself, not the impoverished rules of causality which can only see one step in the front or behind and to which the great connections remain completely hidden (UEXKÜLL, [1934] 2010, p. 160).

Uexküll's theory of meaning can be understood as a case of complementarity between Semiotics and Pragmatism (SHAROV, 2001; ARAUJO, 2012). Semiotics focuses on the interpretation of signs and, complementarily, Pragmatism aims at the relation between user and signs. In the example of spider's web, it is clear the complementarity between Semiotics and Pragmatism: the spider is the user and the web is the sign as carrier of meaning which means an object (the fly).

From the spider example, it can be outlined an image of life. Indeed, for Uexküll (1926, p. 258), we can see the animate world as "the web of life:" life is a web and it trends to complexity from interconnections between different and countless levels of the animate world. In this sense, life is a web of interconnections and it consists of an active process of meaning production (See Illustration 6). This view of life shows the characteristics of a process philosophy (*pace* Whitehead) in which the meaning production is the essence of the process.

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17 See UEXKÜLL (1926, p. 137): "The Theory of Indications (indices)—the organization of the animal is, in principle, at liberty to convert every conceivable combination of impression into indications."



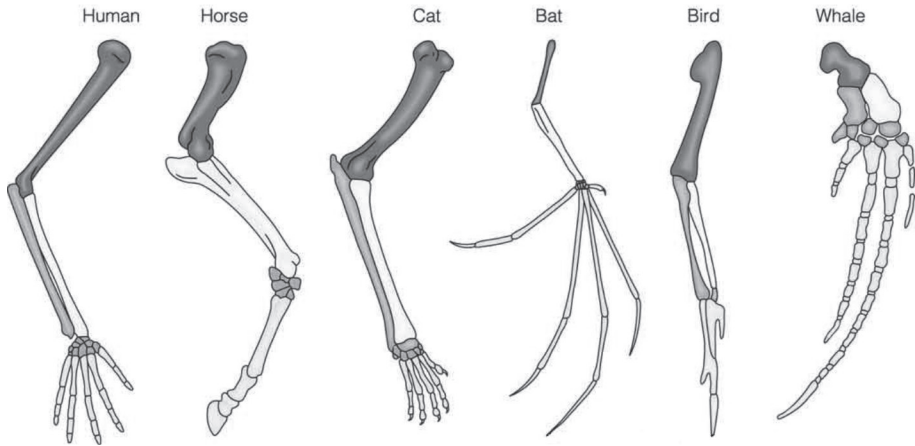
**Illustration 6:** the web of life as an active process of meaning production or semiosis.

#### **4 Self-world, domain of meaning and analogical structure**

In the traditional sense of the animal classification, it is stressed the notion of “homology”. According to Uexküll:

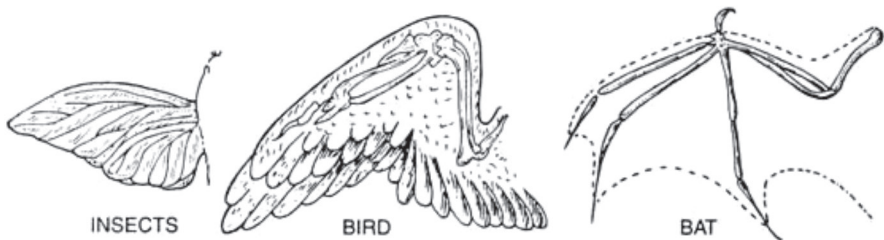
At a very early date the conviction forced itself on zoologists that a classification of animals must be carried out not according to functional, but according to morphological features; not analogy of anatomical parts, but their “homology”, is to be the standard for classification (UEXKÜLL, 1926, p. 110).

Homology is a central notion in evolutionary Biology and it means the similarity between structures of different organisms in relation only to the same embryological origin. The homological structures can or cannot have the same function (see Illustration 6): although man’s arm, horse’s paw, bat’s wing and whale’s fin do not have the same function, they are examples of homological structures insofar as they have the same embryological origin. The homological structures suggest that the individuals have their origins from a common ancestral group, but that does not mean they have a degree of common proximity.



**Illustration 7:** homological structures

As an alternative to the homological approach on the animal classification, Uexküll lays emphasis on the notion of analogy. The *analogical structures* consist in the similarity of embodiment of the same function. Examples of analogical structures are the wings of insects, birds and bats (see Illustration 7). Even though these organs have different embryological origins, they perform the same function.



**Illustration 8:** analogical structures

An organ constructed for a narrowly restricted function is not, no that account [Uexküll's account], more perfect or less perfect than on that serves that functions. The foot of fowl is neither better nor worse than the foot of a duck, although the duck's foot serves for progression in the water as well as on the dry land (UEXKÜLL, 1926, p. 114).

Thereby, I assert here a central point on analogical structures and self-world: regardless of the embryological origin of organisms, self-worlds can be understood as expressions of analogical structures. If one compares the notion of self-world

with the Saussurean sense of structure and the Peircean semiosis, it seems to me that the different self-worlds consist of the embodiment of the same function as domain of meaning and independent from the embryological origin of organisms. According to Uexküll's example of the stem of a blooming meadow flower, among the four self-worlds (or the girl, the ant, the cow and the spittle-bug), all of them play the same role as domains of meaning. Inside each self-world, it must be noted that the blooming meadow flower is a carrier of meaning or a sign. However, it can only be a carrier of meaning or sign if it is useful for some organism. So, it can be asserted here that the meaning has a pragmatic sense or it is plastic:<sup>18</sup> "Each Umwelt forms a closed unit in itself, which is governed, in all its parts, by the meaning it has for the subject" (UEXKÜLL, [1934] 1982, p. 30).

From the example of the blooming meadow flower, one can see the organisms more than a physical mechanism responding to stimuli from outer world. Instead, they can be seen as semiotic beings that use signs as carriers of meaning. Here one can comprehend meaning as use and this point is in accordance with Ryle's famous Wittgensteinian slogan: "Don't ask for the meaning; ask for the use" (RYLE, 1961, p. 229). Thus, in comparison to Uexküll's theory of meaning, if anything is significant, it is because it is a carrier of meaning for an organism. That is, it is useful in the self-world of the organism—so the meaning production becomes part of the successful processes of life in the world. This view is in accordance with life-meaning continuity in Whitehead's philosophy of organism.<sup>19</sup>

## Conclusion

Finally, what it is remarkable in Uexküll's theory of meaning is that he develops an extensive explanation of the living world based on his own linguistic and semiotic terminology. In this sense, one can state an approximation between the notions of structure in Saussure's Linguistic, semiotic processes and Uexküll's theory of meaning. Accordingly, the meaning can be seen as a fundamental biological property and organisms as semiotic beings: "The question as to meaning must therefore have priority in all living beings" (UEXKÜLL, [1934] 2010, p. 151). Uexküll's view of meaning puts forward a very stimulating conceptual alternative to the

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18 Comparatively, for James ([1907] 2000, p. 31), the meaning of an idea has the property of being plastic. Also see Wittgenstein (PI, 43): "For a large class of cases—though not for all—in which we employ the word 'meaning' it can be defined thus: the meaning of a word is its use in the language." So, it can be asserted here a pragmatic conception of meaning as use and according to Uexküll (1926, p. 108): "Isolated, [...] words have no fixed meaning. In the same way, there are things which are susceptible of two different uses, and these, accordingly, when considered alone, have no fixed function. Taken by themselves, they are not implements, but merely objects."

19 "Finally, the extensive continuity of the physical universe has usually been construed to mean that there is a continuity of becoming. But if we admit that 'something becomes', it is easy, by employing Zeno's method, to prove that there can be no continuity of becoming. There is a becoming of continuity, but no continuity of becoming. The actual occasions are the creatures which become, and they constitute a continuously extensive world. In other words, extensiveness becomes, but 'becoming' is not itself extensive" (WHITEHEAD, [1927-8] 1978, p. 35).

reductionism of the functionalist and evolutionary fields in contemporary Biology in which organisms are semiotic and active beings and not merely passive objects for investigations.

## References

- ARISTOTLE. *De Anima* (DA). Apresentação, tradução e notas de Maria Cecília Gomes dos Reis. São Paulo: Editora 34, 2006.
- ARAÚJO, A. Significação sem representação: a teoria da significação de Jakob von Uexküll. In: *Ciências & Cognição*: revista interdisciplinar de estudos da cognição. Rio de Janeiro: UFRJ, 2012, Vol. 17(2), p. 98-114. Available in: <<http://www.cienciasecognicao.org/revista/index.php/cec/index>>. Accessed on 12/14/15.
- AUSTIN, J. L. *Philosophical Papers*. Oxford: Oxford University Press, 1961.
- BARTHES, R. A actividade estruturalista. In: *Estruturalismo – antologia de textos teóricos*. Eduardo Prado Coelho (seleção e introdução). Trad. de Maria dos Reis Colares, Antônio Ramos Rosa e Eduardo Prado Coelho. São Paulo: Martins Fontes, 1967.
- CASSIRER, E. *Ensaio sobre o homem*. Trad. de Tomás Rosa Bueno. São Paulo: Martins Fontes, 1994.
- DEELY, J. Semiotics ans Jakob on Uexküll's concept of Umwelt. In: *Sign Systems Studies*, Tartu, 32.1/2, 2004.
- ECO, U. *Tratado geral de semiótica*. Trad. de Antônio de Pádua Danesi e Gilson César Cardoso de Souza. São Paulo: Perspectiva, 2005.
- GENS, H. *Jakob von Uexküll, explorateur des milieux vivants*. Paris, Hermann, 2014.
- GOLDSCHMIDT, R. B. *Portraits from memory: Recollections of a zoologist*. Seattle: University of Washington Press, 1956.
- JAMES, W. Remarks on Spencer's definition of mind as correspondence. In: *The Journal of Speculative Philosophy*, v. 12, n. 1, 1878, p. 1-18. Available in: <<http://www.jstor.org/stable/25666067>>.
- KOUTROUFINIS, S. *Life and process. Towards a new Biophilosophy*. Berlin, Boston: De Gruyter, 2014.
- KULL, K. Jakob Uexküll: An introduction. In: *Semiotica*, Copenhagen, 134(1/4): p. 1-59, 2001.
- \_\_\_\_\_. and EMMECH, C. (ed.). *Towards a Semiotic Biology – Life is the action of signs*. London: Imperial College Press, 2011.
- LONGO, G. and MONTÉVIL, M. *Perspectives on organism*. Paris: Springer, 2013.
- MAYR, E. *Biologia, ciência única*. Trad. de Marcelo Leite; São Paulo: Companhia das Letras, 2005.

PEIRCE, C. S. *Semiótica*. Trad. de José Coelho Teixeira Neto. São Paulo: Editora Perspectiva, 1977.

\_\_\_\_\_. *Collected papers of Charles Sanders Peirce*. HARTSHORNE, Charles; WEISS, Paul; BURKS, Arthur W. (eds.). Cambridge, MA: Harvard University Press, 1931-1958. [Cited as CP followed by volume and paragraph number.]

POULLION, J. Uma tentativa de definição. In: *Estruturalismo: antologia de textos teóricos*. Eduardo Prado Coelho (Seleção e Introdução). Trad. de Maria dos Reis Colares, Antônio Ramos Rosa e Eduardo Prado Coelho. São Paulo: Martins Fontes, 1967.

ROSEMBERG, A. Reductionism (and antireductionism) in Biology. In: *Cambridge Companion to The Philosophy of Biology*. Edited by HULL, D. L. and RUSE, M. Cambridge: Cambridge University Press, 2008.

RYLE, Gilbert. *The concept of mind*. New York: Routledge, 2009.

\_\_\_\_\_. and FINDLAY J. N. Use, usage and meaning. In: *Proceedings of the Aristotelian Society*. Supplementary Volumes, v. 35, 1961, p. 223-242.

RÜTING, T. History and significance of Jakob von Uexküll and of his institute in Hamburg. In: *Sign Systems Studies*, Hamburg, Germany, 32.1/2, 2004.

SANDERS, C. Introduction: Saussure today. In: *Cambridge companion to Saussure*. Cambridge: Cambridge University Press, 2006.

SAUSSURE, F. de. *Curso de lingüística geral*. Trad. de Antônio Chelini, José Paulo Paes e Izidoro Blinkstein. São Paulo: Cultrix, 2000.

SBISÀ, M. *Philosophical perspectives for pragmatics*. Edited by SBISÀ, M., Jan-Ola ÖSTMAN, J-O., and VERSCHUEREN, J. Amsterdam/ Philadelphia: John Benjamins Publishing Company, 2011.

SEBEOK, T. *Signs: An introduction to Semiotics*. Toronto: Toronto University Press, 2001.

SHAROV, A. Towards the semiotic paradigm in biology. In: *Semiotica*, Toronto: De Gruyter Mouton, v. 120, p. 403-419, 1998.

\_\_\_\_\_. Umwelt theory and pragmatism. In: *Semiotica*, Toronto: De Gruyter Mouton, v. 134, p. 211-228, 2001.

UEXKÜLL, von J. *Theoretische Biologie*. 1. Aufl. Berlin, Gbr. Paetel/ 2. gänzl. neu bearb. Aufl. Berlin: J. Springer, 253, 1920.

\_\_\_\_\_. *Theoretical Biology*. New York: Harcourt, Brace & Company, 1926.

\_\_\_\_\_. A stroll through the worlds of animals and men. In: *Instinctive behavior*. Claire H. Schiller (ed.). New York: Intenational University Press, 1957.

\_\_\_\_\_. The theory of meaning. semiotica. In: *Semiotica*, Copenhagen, v. 42, n. 1, 1982, p. 25-82.



UEXKULL, von T. A teoria da *Umwelt* de Jakob von Uexüll. In: *Revista Galáxia*. São Paulo, n.7, 2004, p. 19-48. Available in: <<http://www.pucsp.br/pos/cos/galaxia/num07/completo/cap02.pdf>> or <[http://leandrosalvador.com.br/ls/html/textos/academicos/semiotica/umwelt\\_uexkull.pdf](http://leandrosalvador.com.br/ls/html/textos/academicos/semiotica/umwelt_uexkull.pdf)>. Last accessed on 12/14/15.

WITHEHEAD, A. N. *Process and reality*. New York: The Free Press, 1978.

WINTHROP-YOUNG, G. Bullbles and webs: a backdoor stroll – through the readings of Uexküll. In: UEXKÜLL, von J. *A foray into the worlds of animals and humans*. Translated by Josephe D. O'Neil. Minneapolis: Minneapolis University Press, 2010.

WITTGENSTEIN, L. *Philosophical investigations*. Translated by G. E. M. Anscombe. Oxford (England): Basil Blackwell, 1986.

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Data de envio: 13-03-16

Data de aprovação: 05-05-16

